

## REMARKS

The present Amendment and Response is submitted in reply to the Office Action dated March 27, 2008. Claims 1-6 were pending in the Office Action. By the present Amendment, claims 2-3 are canceled; claims 1 and 4 are amended; and claims 7-8 are added. Claims 1 and 4-8 are pending for consideration.

In the Office Action, the Examiner:

rejected Claims 1, 5, and 6 under 35 USC § 102(b) as anticipated by Someya (JP 59-093502); and

rejected Claims 2-4 under 35 USC § 103(a) as obvious over Someya in view of Shiro (JP 2002-174204).

Applicants respectfully respond to these rejections below.

### Rejections Under 35 USC § 102

Examiner rejected Claims 1, 5, and 6 under 35 USC § 102(b) as anticipated by Someya (JP 59-093502). As amended, claim 1 incorporates the former recitations of canceled claims 2 and 3. Claims 5 and 6 depend from claim 1 and include additional recitations thereto.

An anticipation rejection is improper unless a single prior art reference shows or discloses *each and every claim limitation*.

Examiner concedes that Someya does not show or disclose the recitations of canceled claims 2 and 3, as incorporated in amended claim 1. Rather, Examiner looks to Shiro to supply these recitations. (See Office Action, page 3). Thus, the present amendment to claim 1 overcomes the rejections of claims 1, 5, and 6 under 35 USC § 102(b). Applicants respectfully request that the rejections be withdrawn.

### **Rejections Under 35 USC § 103**

Examiner rejected Claims 2-4 under 35 USC § 103(a) as obvious over Someya in view of Shiro (JP 2002-174204). The limitations of cancelled Claims 2 and 3 are incorporated in Amended Claim 1, and Claim 4 is amended to depend from amended Claim 1.

Claim 1 recites a pressure device comprising a weight offset pressure diaphragm provided between said reciprocating body and said cylinder body and partitioning and forming a weight offset pressure chamber for applying a weight offset thrust in a direction opposite to said pressure thrust; and an offset load adjusting diaphragm provided between said reciprocating body and said cylinder body, partitioning and forming said weight offset pressure chamber along with said weight offset pressure diaphragm, and blocking off the weight offset pressure chamber and an ambient-air pressure chamber. Claim 4 further recites that said weight offset pressure chamber is filled with compressed fluid that is set at fluid pressure capable of retaining said reciprocating body in a state in which said reciprocating body is out of contact with any of inner wall surfaces of said cylinder body.

A *prima facie* case of obviousness under 35 USC §103(a) is established if the teachings from the prior art itself appear to suggest the claimed subject matter “as a whole” to a person of ordinary skill in the art.

Applicants submit herewith a translation of relevant excerpts from Shiro (Exhibit A). Shiro fails to teach or suggest at least a weight offset pressure diaphragm *or* a weight offset pressure chamber, as recited by amended claim 1. Rather, at most, Shiro discloses diaphragms 21, 22, and 23 that partition pressure chambers P1 and P2 within a cylinder body 10. Shiro’s diaphragms 21, 22, and 23

move with the piston 30 and exert position-varying forces on the piston 30, as further explained below. By contrast, a weight *offset* chamber and diaphragm must exert a force that does not vary with position, because weight does not vary with position. Thus, Shiro fails to teach or suggest the claimed weight offset diaphragm and pressure chamber.

As best shown by Figures 2 and 4 of Shiro, up or down motion of the piston 30 deforms each of the diaphragms 21, 22, and 23. Deformation of the diaphragms results in elastic forces that are exerted on the piston 30 by the diaphragms. The elastic forces vary according to the diaphragm deformations. Accordingly, up or down motion of the piston 30 results in varying elastic forces that restrain the motion of the piston. Thus, the diaphragms and pressure chambers of Shiro do not provide weight offset because the forces exerted on the piston 30 vary as the piston moves, while the weight of the piston 30 does not change as the piston moves.

Additionally, regardless of elastic forces, each of the diaphragms 21, 22, and 23 defines an effective pressure-receiving area. Applicants submit herewith an "Explanation about Effective Pressure-Receiving Area" (Exhibit B), and a "Reference Drawing" (Exhibit C). As further explained in the submitted exhibits, deformation of each of the diaphragms 21, 22, and 23 changes the net force exerted on the piston 30 because deformation of a diaphragm changes the effective pressure-receiving area of the diaphragm.

This deformation happens because each diaphragm comprises a central portion abutting on a surface of the piston 30 disposed perpendicular to an axis of the cylinder body 10; a flange portion embedded in the cylinder body 10; and a curved or frustoconical portion disposed between the central portion and the

flange portion. Thus, when a pressure P is applied to Shiro's second pressure chamber P2, the piston 30 moves downward and the curved or frustoconical portion of the diaphragm 22 deforms and moves downward.

Accordingly, the center of curvature of the curved portion of the diaphragm 21 moves toward the axis of the cylinder body 10 as the piston 30 moves downward. Alternatively, a normal to a radial section of the frustoconical portion, corresponding to the direction of a sectional pressure force vector, increasingly diverges from the axis of the cylinder body 10 as the piston 30 moves downward.

As the center of curvature moves toward the axis of the cylinder body 10, or as the normal to the radial section of the frustoconical portion diverges from the axis of the cylinder body 10, a downward component of the sectional pressure force vector diminishes. Thus, the total force vector exerted on the diaphragm 22 by the fluid within the pressure chamber P2 also diminishes. For Examiner's further understanding, Applicants submit herewith a non-patent literature reference titled "Characteristics of the Pneumatic Circuit of a Diaphragm Type Pneumatic Pressure Control Valve" (Exhibit D), disclosing equations and additional diagrams regarding calculation of effective pressure-receiving area. Applicants respectfully submit that, as explained in Exhibit D (page 44, left column, lines 9-12), "when the diaphragm is displaced, its effective pressure-receiving area *varies* and it produces an operation of a non-linear *spring*." (Emphasis added).

By contrast, the *weight offset* pressure diaphragm recited by claim 1 is inherently configured so that it does *not* vary in effective pressure-receiving area as a reciprocating body moves within a housing chamber, but rather provides a

constant force to offset weight. Thus, the structure disclosed by Shiro is fundamentally different from the structure recited by claim 1 and dependent claim 4. Further, Applicants respectfully submit that, taking full consideration of the foregoing arguments and the exhibits submitted herewith, one of ordinary skill in the art would not reasonably expect to achieve the recitations of claim 1 using the structure of Shiro.

For at least the stated reasons, the rejection of dependent claim 4 over Someya and Shiro is improper under 35 USC § 103(a) and should be withdrawn.

#### **New Claims**

New claim 7 is supported at least by lines 17-20 of page 13 in the present specification, and is patentable for at least the reasons stated regarding claim 1. New claim 8 is similar to claim 1, and supported at least by original claim 1 and by paragraph [0037] of the present specification. Claim 8 is patentable for at least the reasons stated regarding claim 1.

#### **Conclusion**

As Applicants have traversed each and every rejection raised by Examiner, hereby it is respectfully requested that Examiner withdraw the present objections and rejections and pass to issue claims 1 and 4-8.

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Applicants believe that no additional fees are due in connection with this Amendment and Response. If such additional fees are deemed necessary, or if any overpayment obtains, Attorneys for Applicants hereby authorize the Commissioner to deduct such fees from or to credit such overpayment to our Deposit Account 13-0235.

Respectfully submitted,

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